Review Areas to be Addressed in a COL Application Referencing a Certified Design

Chapter 11 Radioactive Waste Management

11.2 Liquid Waste Management Systems

11.2.1 Design Bases

- Using plant design-specific conditions, update or confirm the design bases of the liquid waste management systems, including design objectives and criteria in treating liquid radioactive wastes and in estimating annual quantities of radioactive materials discharged to the environment.

- In accordance with the requirements of Part 20.1406, describe how plant-specific design features will minimize, to the extent practicable, contamination of the facility and environment, facilitate decommissioning, and the generation of radioactive waste.

- Describe how plant-specific design conditions will follow the guidance provided in Regulatory Guides (RG) 1.33, 1.109, 1.110, 1.112, 1.113, 1.140, and 1.143. If the plant will not follow the guidance contained in these RGs, describe the specific alternative approaches to be used and how alternate approaches comply with the regulatory positions of the RGs.

11.2.2 System Description

- Using plant design-specific conditions and site-specific features, update or confirm the description of parameters, assumptions, and bases used to calculate releases of radioactive materials in liquid effluents, using NUREG-0016 (BWRs) or NUREG-0017 (PWRs) and Regulatory Guide 1.112.

- Using plant design-specific conditions and site-specific features, describe all radioactive liquid waste effluent discharge points to the environment. Provide basis for in-plant dilution before the point of release and dilution from the point of discharge to potentially exposed offsite dose receptors.

- Using plant design-specific conditions, confirm or update plant water balance needs and describe radionuclide concentrations in process streams and release rates. Confirm or update maximum and expected release rates and radioactivity levels during normal operation and anticipated operational occurrences.

- Using plant design-specific conditions, update or confirm the description of the liquid management system and process flow diagrams, including parameters used to determine effluent discharge flow rates, decontamination factors by types of ion-exchange media, instrumentation and controls that govern system operation and termination of releases, and system interfaces with potential bypass routes to non-radioactive systems or as potential unmonitored releases.

- Discuss system capability of and requirements for utilizing mobile processing equipment for routine operations and outages. Using plant design-specific conditions, describe design features used to ensure that interconnections between plant systems and mobile processing equipment will avoid the contamination of non-radioactive systems and uncontrolled releases of radioactivity in the environment (see IE Bulletin No. 80-10 for details).

- For site designs involving multi-unit stations, describe systems or subsystems that will be shared among plants, e.g., a new plant with an existing one. Identify all equipment and components that will be shared between systems. Describe the shared use of radioactive liquid waste processing systems for all liquid waste streams. Describe both the normal operation of each system and any differences in system operations during anticipated operational occurrences, such as startups, shutdowns, and refueling.

11.2.3 Radioactive Releases

- Describe how operational programs and procedures will be used to demonstrate compliance with liquid effluent concentration limits of Appendix B (Table 2, Col. 2) to Part 20; dose limits to members of the public under Part 20.1302; and the EPA's environmental standards of 40 CFR Part 190.

- Describe how operational programs and procedures will be implemented to ensure that radioactive material concentrations in liquid effluents are in compliance with Part 50.34a and ALARA design objectives of Appendix I to Part 50.

- Describe how operational programs and procedures will be used to demonstrate compliance with the requirements of General Design Criteria 60, 61, and 64 of Appendix A to Part 50 in monitoring and controlling liquid effluent releases during normal operations and anticipated operational occurrences.

- Describe how operational programs and procedures will be used to optimize the selection of ion-exchange media, filters, and other types of filtration media in maximizing decontamination factors and performance of the liquid waste management systems.

- Describe operational criteria that will be used to determine when processed liquid wastes will be recycled for reuse or further treated and discharged to the environment.

- Describe how operational programs and procedures will be used to ensure that interconnections between plant systems and mobile processing equipment will avoid the contamination of non-radioactive systems and uncontrolled releases of radioactivity in the environment, as per IE Bulletin No. 80-10.

- In accordance with the requirements of Part 20.1406, describe how operational procedures, to the extent practicable, will minimize contamination of the facility

and liquid radioactive effluent releases to the environment.

- Indicate how operational programs and procedures will follow the guidance provided in Regulatory Guides (RG) 1.33, 1.109, 1.110, 1.112, 1.113, 1.140, and 1.143. If operational programs and procedures will not follow the guidance contained in these RGs, describe the specific alternative approaches that will be used and how they will comply with the regulatory positions of these RGs.

11.3 Gaseous Waste Management Systems

11.3.1 Design Bases

- **Using plant design-specific conditions, update or confirm the design bases of the gaseous waste management systems, including design objectives and criteria in treating liquid radioactive wastes and in estimating annual quantities of radioactive materials discharged to the environment.**

- In **accordance with the requirements of Part 20.1406, describe how plant-specific design features will minimize, to the extent practicable, contamination of the facility and environment, facilitate decommissioning, and the generation of radioactive waste.**

- Describe how plant-specific design conditions will follow the guidance provided in Regulatory Guides (RG) 1.33, 1.109, 1.110, 1.111, 1.112, 1.140, and 1.143. If the plant will not follow the guidance contained in these RGs, describe the specific alternative approaches to be used and how alternate approaches comply with the regulatory positions of the RGs.

11.3.2 System Description

- **Using plant design-specific conditions and site-specific features, update or confirm the description of parameters, assumptions, and bases used to calculate releases of radioactive materials in airborne effluents, using NUREG-0016 (BWRs) or NUREG-0017 (PWRs) and Regulatory Guide 1.112.**

- **Using plant design-specific conditions and site-specific features**, **describe** all airborne effluent release points (stacks and vents) to the environment. Provide basis **for the bases of downwind atmospheric dispersion and deposition factors and selection potentially exposed offsite dose receptor locations.**

- Using plant design-specific conditions, **update or confirm expected radionuclide concentrations in process streams and airborne release rates. Confirm or update** maximum and expected release rates and radioactivity levels during normal operation and anticipated operational occurrences.

- **Using plant design-specific conditions, update or confirm the description of the gaseous management system and process flow diagrams, including parameters used to determine effluent discharge flow rates, decontamination factors or**

efficiencies by types of charcoal absorbent media and HEPA filtration systems, instrumentation and controls that govern system operation and termination of releases, and system interfaces with potential bypass routes to non-radioactive systems or as potential unmonitored releases.

- For plant designs involving the use of mobile processing equipment, describe design features applied to ensure that interconnections with permanent plant systems and equipment will avoid the contamination of non-radioactive systems and uncontrolled releases of radioactivity in the environment.

- For site designs involving multi-unit stations, describe systems or subsystems that will be shared among plants, e.g., a new plant with an existing one. If applicable, identify all equipment and components that may be shared between systems during anticipated operational occurrences, such as startups, shutdowns, and refueling.

11.3.3 Radioactive Releases

- Describe how operational programs and procedures will be used to demonstrate compliance with airborne effluent concentration limits of Appendix B (Table 2, Col. 1) to Part 20; dose limits to members of the public under Part 20.1302; and the EPA's environmental standards of 40 CFR Part 190.

- Describe how operational programs and procedures will be implemented to ensure that radioactive material concentrations in airborne effluents are in compliance with Part 50.34a and ALARA design objectives of Appendix I to Part 50.

- Describe how operational programs and procedures will demonstrate compliance with the requirements of General Design Criteria 60, 61, and 64 of Appendix A to Part 50 in monitoring and controlling airborne effluent releases during normal operations and anticipated operational occurrences.

- Describe how operational programs and procedures will be used to optimize the selection of charcoal adsorbent media, HEPA filters, and other types of filtration media, in maximizing decontamination or removal efficiencies and performance of the gaseous waste management systems.

- Describe how operational procedures will be used to optimize the operational performance of charcoal delay beds, gas storage and decay tanks holdup times, and replacement charcoal beds (main and guard tanks) in minimizing radionuclide concentrations in airborne effluents discharged to the environment.

- Describe how operational programs and procedures will be used to ensure that interconnections between plant systems and mobile processing equipment will avoid the contamination of non-radioactive systems and uncontrolled releases of radioactivity in the environment, as per IE Bulletin No. 80-10.

- In accordance with the requirements of Part 20.1406, describe how operational procedures, to the extent practicable, will minimize contamination of the facility and airborne radioactive effluent releases to the environment.

- Indicate how operational programs and procedures will follow the guidance provided in Regulatory Guides (RG) 1.33, 1.109, 1.110, 1.111, 1.112, 1.140, and 1.143. If operational programs and procedures will not follow the guidance contained in these RGs, describe the specific alternative approaches that will be used and how they will comply with the regulatory positions of these RGs.

11.4 Solid Waste Management System

11.4.1 Design Bases

- Using plant design-specific conditions, update or confirm the design bases of the solid waste management system, including design objectives and criteria for radioactive waste handling and treatment systems, and instrumentation and controls that govern system operation and termination of processes and releases.

- Describe the design bases for installation of any mobile or temporary equipment used for processing solid and wet/liquid radioactive waste in accordance with the guidance of Regulatory Guide 1.143. Describe the systems, operating characteristics, waste volume reduction factors, decontamination factors, ALARA design features, waste processing rates, and instrumentation and controls that govern system operation and termination of releases.

- If the design of solid waste management systems is based on topical reports, provide all associated reports and addressed how the proposed system will be integrated considering plant-specific design conditions.

- In accordance with the requirements of Part 20.1406, describe how plant-specific design features will minimize, to the extent practicable, contamination of the facility and the environment, facilitate decommissioning, and minimize, to the extent practicable, the generation of radioactive waste.

- Describe how plant-specific design conditions will follow the guidance provided in Regulatory Guides (RG) 1.33, 1.109, 1.110, 1.112, 1.113, 1.140, and 1.143. If the plant will not follow the guidance contained in these RGs, describe the specific alternative approaches to be used and how alternate approaches comply with the regulatory positions of the RGs.

11.4.2 System Description

- Using plant design-specific conditions, update or confirm the description of the solid management system and flow diagrams used to process liquid wastes, de-watered wastes, and packaging dry solid wastes. Describe instrumentation and controls that will govern system operation and termination of processes and

effluent releases.

- For plant designs involving the use of mobile processing equipment, describe design features applied to ensure that interconnections with permanent plant systems and equipment will avoid the contamination of non-radioactive systems and uncontrolled releases of radioactivity in the environment (see IE Bulletin No. 80-10 for details).

- Using plant-specific design conditions, describe the design features incorporated to prevent, control, and collect the release of radioactive materials due to overflows from tanks containing liquids, sludge, spent resins, etc. Discuss the potential for an operator error or equipment malfunction to result in uncontrolled and unmonitored releases of radioactive material.

- For site designs involving multi-unit stations, describe systems or subsystems that will be shared among plants, e.g., a new plant with an existing one. If applicable, identify all equipment and components that may be shared between systems during anticipated operational occurrences, such as startups, shutdowns, and refueling.

- Using plant design-specific conditions, update or confirm the description of expected waste streams, and yearly estimates of waste volumes, as generated and as shipped for disposal by waste streams.

- Using plant design-specific conditions, describe facility features and provisions used for the long-term storage of radioactive wastes. Describe the design bases and criteria, expected waste volumes and storage capacity, expected radioactivity inventories, and safety considerations in handling and storing wastes, and measures applied for spill prevention and control.

- Using plant design-specific conditions and site-specific features, describe all liquid and airborne effluent release points to the environment associated with the operation of the solid waste management system.

11.4.3 Radioactive Releases

- Describe how operational programs and procedures will be used to demonstrate compliance with liquid and airborne effluent concentration limits of Appendix B (Table 2, Col. 1 and 2) to Part 20; dose limits to members of the public under Part 20.1302; and the EPA's environmental standards of 40 CFR Part 190.

- Describe how operational programs and procedures will be implemented to ensure that radioactive material concentrations in airborne and liquid effluents are in compliance with Part 50.34a and ALARA design objectives of Appendix I to Part 50.

- Describe how operational programs and procedures will used to demonstrate compliance with the requirements of General Design Criteria 13, 60, 63, and 64

of Appendix A to Part 50 in monitoring and controlling airborne and airborne effluent releases during normal operations and anticipated operational occurrences. Describe the bases for setting instrumentation and control action/alarm levels governing system operation and termination of processes and releases.

- Describe how operational programs and procedures will be used to optimize the performance of the solid waste management systems by maximizing waste volume reduction factors, and maximizing decontamination factors by using appropriate filtration and ion-exchange media.

- Describe how operational programs and procedures will be used to ensure that interconnections between plant systems and mobile processing equipment will avoid the contamination of non-radioactive systems and uncontrolled releases of radioactivity in the environment, as per IE Bulletin No. 80-10.

- In accordance with the requirements of Part 20.1406, describe how operational procedures, to the extent practicable, will minimize contamination of the facility and airborne and liquid radioactive effluent releases to the environment.

- Describe how the process control program (PCP) and operational procedures will ensure compliance with the provisions of Parts 61.55 and 61.56 on waste classification and characteristics, waste transfers and shipping manifest requirements of Appendix G to Part 20, NRC and DOT shipping regulations (Part 71, and 49 CFR Parts 171 - 180), and waste acceptance criteria of authorized radioactive waste disposal facilities. Provide a copy of the process control program (PCP).

- Indicate how operational programs and procedures will follow the guidance provided in Regulatory Guides (RG) 1.33, 1.140, and 1.143. If operational programs and procedures will not follow the guidance contained in these RGs, describe the specific alternative approaches that will be used and how they will comply with the regulatory positions of these RGs.

11.5 Process and Effluent Radiological Monitoring and Sampling Systems

11.5.1 Design Bases

- Using plant design-specific conditions, update or confirm the design bases of the process and effluent radiological monitoring and sampling systems during normal operations, anticipated operational occurrences, and postulated accidents, including controls that govern system operation and termination of processes and releases to the environment.

- Describe the design bases and criteria for the selection of the types of monitoring systems, instrumentation detection sensitivities, expected activity or concentration levels, and operational dynamic ranges for all process and effluent radiological monitoring and sampling systems.

- Describe how plant-specific conditions and operational program aspects of the process and effluent monitoring and sampling system will follow the guidance of ANSI N13.1-1999 and ANSI N42.18-1980, Regulatory Guides (RG) 1.21, 1.33, 1.97, and 4.15, Appendix 11.5-A (Section 11) of the Standard Review Plan, and Generic Letter 89-01 (Supplement No. 1), and Radiological Assessment Branch Technical Position (Rev. 1, Nov. 1979). If this guidance will not be followed, describe the specific alternative methods that will used and how alternate approaches comply with the regulatory positions of the RGs.

11.5.2 System Description

- Using plant-specific conditions, describe effluent radiological monitoring instrumentation systems and sampling systems that will be used to monitor and control releases of radioactive materials during normal operations, anticipated operational occurrences, and during postulated accidents.

- Using plant-specific conditions, update or confirm all process and effluent streams to be monitored by radiation detection instrumentation or sampled for separate analyses, the purpose of each monitoring or sampling function, location of detectors and **annunciator panels**, and system provisions for **automatic controls and actions, including provisions for the termination of process flows and releases.**

- **Using plant-specific conditions, describe the locations of instrumentation and sampling points; expected process and effluent flow rates, composition, and concentrations; type of measurement systems (e.g., gross, beta-gamma, radionuclide concentrations); types of sample nozzles or other sample equipment designed in accordance with ANSI N13.1-1999; equipment used to obtain representative samples and purging of sampling lines; and analytical systems and sensitivity levels by selected analytical methods and types of sampling media.**

- **Using plant-specific conditions**, describe the design features used to address situations when sampling equipment exhibit elevated levels of external radiation, the placement of such equipment in shielded cubicles, and the use of temporary or permanent shielding mounted on or in the immediate vicinity of sampling equipment.

- Using plant-specific conditions, update or confirm system design features used to demonstrate compliance with General Design Criteria 13, 60, 61, 63, and 64 of Appendix A to Part 50, as they relate to monitoring and controlling radioactive releases during routine operation, anticipated operational occurrences, and accident conditions with the requirements of 10 CFR Parts 50.34(f)(2)(xvii) and 50.34(f)(2)(xxvii).

11.5.3 Effluent Monitoring and Sampling

- **Using plant design-specific conditions, describe operational programs** and procedures that will be used to monitor the operation of the radiological process and effluent instrumentation systems; **obtain representative samples and purge sampling lines; and analyze samples for radioactivity.**

- **Using plant-specific conditions**, describe how programs and procedures will be used to demonstrate compliance with Part 20.1302 dose limits, Part 20 Appendix B effluent concentrations (Table 2, Col. 1 and 2) to members of the public in unrestricted areas, and EPA environmental radiation standards of 40 CFR Part 190.

- **Describe operational programs and procedures that will be used to demonstrate compliance with Part 50.36a for technical specifications on effluents, and Part 50.34a and Appendix I guidelines for maximally exposed offsite individual doses and population doses via liquid and gaseous effluents. Indicate how the guidance of Regulatory Guides 1.109 and 1.111 or 1.113 will be followed. If this guidance will not be followed, describe the specific alternative methods to be used and how alternate approaches comply with the regulatory positions of the RGs.**

- **Describe operational programs and procedures that will be used to establish instrumentation trips/alarms set-points in controlling and terminating effluent releases, and provide bases for the chosen set-points, including a discussion on how they will be established for all monitored effluent streams.**

- **Describe operational programs and procedures that will be used to demonstrate compliance with the requirements of General Design Criterion 64 (Appendix A to Part 50) with respect to effluent discharges during normal operations and anticipated operational occurrences and postulated accidents.**

- **Describe operational programs and procedures that will be used to calibrate, maintain, inspect, decontaminate, purge sampling lines, and replace radiological monitoring instrumentation and sampling systems.**

- **Describe operational programs and procedures that will be used for detection of radioactivity in non-radioactive systems and preventing unmonitored and uncontrolled releases of radioactive material to the environment.**

- **Using plant-specific and site-specific features, provide the plant's standard radiological effluent controls (SREC), the offsite dose calculation manual (ODCM), and the radiological environmental monitoring program (REMP), based on the guidance of NUREG-1301 (PWRs) or NUREG-1302 (BWRs), NUREG 0133, Regulatory Guides (RG) 1.21, 1.33, and 4.15, Appendix 11.5-A (Section 11) of the Standard Review Plan, and Generic Letter 89-01 (Supplement No. 1), and Radiological Assessment Branch Technical Position (Rev. 1, Nov. 1979).**

11.5.4 Process Monitoring and Sampling

- Describe how operational programs and procedures will be used to **comply with the requirements of GDC 60 of Appendix A to Part 50 with respect to the automatic closure of isolation valves in gaseous and liquid effluent discharge paths.**

- **Describe how operational programs and procedures will be used to comply with the requirements of GDC 63 of Appendix A to Part 50 with respect to the monitoring of radiation levels in radioactive waste process systems.**

- **Describe how operational programs and procedures will be used in purging sample lines**, defining waste tank recirculation rates, gas storage and decay tanks **holding times**, and specifying representative sampling conditions and sampling frequency.

- **Describe how operational programs and procedures will be used to** apply methods in controlling and minimizing the spread of radioactive contamination during sample collection and preparation of samples for analysis.